JOINT FORCES STAFF COLLEGE
JOINT ADVANCED WARFIGHTING SCHOOL

TRANSFORMATION AND DEFENSE ACQUISITION: IT CAN WORK

by

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The contents of this paper reflect my own personal views and are not necessarily endorsed by the Joint Forces Staff College or the Department of Defense.

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14. ABSTRACT

The current Planning, Programming, and Budgeting System (PPBS) provides a necessary framework for responsible acquisition with fair competitiveness to industry and proper spending of National resources. But the structured nature and Service competitiveness of the PPBS can lead to difficulties in inserting technologies or capabilities which show merit and in some cases threaten legacy programs of record. The relatively inflexible nature of the two year PPBS cycle with respect to rapid transformation can be a barrier to successful transition of concepts to fielded capabilities. Without a dedicated approach designed with the end in mind, transformational initiatives run the serious risk of failing the "so what" test and may do little to solve joint warfighting issues. This paper provides one method to help give the greatest potential for successful transition of a transformational initiative.

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Abstract

Transformation of the Joint Force has been a focus of effort throughout the Services and Department of Defense Agencies for the past decade. An evaluation of the successes achieved through Department of Defense transformation efforts indicates where we must apply future focus to ensure the United States can remain the single most versatile, agile, and lethal fighting force in the world.

The current Planning, Programming, and Budgeting System (PPBS) provides a necessary framework for responsible acquisition with fair competitiveness to industry and proper spending of National resources. But the structured nature and Service competitiveness of the PPBS can lead to difficulties in inserting technologies or capabilities which show merit and in some cases threaten legacy programs of record. The relatively inflexible nature of the two year PPBS cycle with respect to rapid transformation can be a barrier to successful transition of concepts to fielded capabilities. Despite successful experimentation and in some cases, use by fielded forces during experimental development, lack of a sufficient transition planning with appropriate funding for a new start capability may result in its untimely termination.

In the recent past, several transformational concepts have attempted to make the jump to reality through doctrine or Service programs of record with some limited success. An evaluation of a several concepts pushed forward from the US Joint Forces Command's Millennium Challenge 02 Experiment and the success in transitioning some of those concepts to Joint Force capabilities is reviewed. One concept in particular, the Joint Fires Initiative is presented as an example of a successful concept developed with a deliberate process to use for success in moving the concept to a fielded capability. The

process model developed by the Joint Fires Initiative team involves a dedicated study of all relevant Joint Force requirements which exist in Service centers of excellence and centers for lessons learned, Combatant Command Integrated Priority Lists, Warfighter Requirements Statements, and Department of Defense Agencies such as the Defense Science Lab and the Defense Advanced Research Projects Agency.

Upon collection of requirements and lessons learned pertinent to the joint warfighting issue to be addressed, vetting of the requirements across all elements of the Joint Force and in some cases the Interagency is required. Searching for suitable solutions, methods, or capabilities throughout industry, the Services, and academia can yield potential solutions. Experimentation across a vast array of simulation and live events will qualify and quantify the validity of the proposed transformational capability. And finally, an appropriately resourced transition plan will ensure the capability enters the Joint Force and is sustained for its life cycle.

Without a dedicated approach designed with the end in mind, transformational initiatives run the serious risk of failing the “so what” test and may do little to solve joint warfighting issues. A dedicated plan for successful transition with a sponsor in mind and Joint Force equities met will result in a transformational capability that will serve the Joint Force as we move forward in a world of uncertainty.

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List of Acronyms

ACAT	Acquisition Category
ACTD	Advanced Concept Technology Demonstration
AOR	Area of Responsibility
DARPA	Defense Advanced Research Projects Agency
DOTMLPF	Doctrine, Organization, Training, Materiel, Leadership, Personnel; Facilities
IPL	Integrated Priority List
IRAD	Internal Research and Development
JCOA	Joint Center for Operational Analysis
JETCD	Joint Experimentation Transformation and Concepts Division
JROC	Joint Requirements Oversight Council
JROCM	Joint Requirements Oversight Council Memorandum
JTF	Joint Task Force
NATO	North Atlantic Treaty Organization
NAVCENT	Naval Forces Central Command
PPBS	Planning, Programming, and Budgeting System
TST	Time Sensitive Target

1. Introduction

Transformation of the United States Military Services is a vital requirement and during the past decade, our transformation efforts have been in the forefront of acquisition programs and experimentation efforts for both the Joint Force and Service-specific development. An evaluation of the successes achieved through Department of Defense transformation efforts indicates where we must apply future focus to ensure the United States can remain the single most versatile, agile, and lethal fighting force in the world. Part and parcel to the success of our continued transformation is an effective Defense Acquisition process capable of engaging transformational concepts proven as capabilities. As we aim to transform, we must ensure our acquisition process does not remain mired in the past but rather migrates in a way to support the merging of capabilities that spiral out of experimentation or other transformational startup methods.

The current Planning, Programming, and Budgeting System (PPBS) provides a necessary framework for responsible acquisition with fairness to industry and proper spending of National resources. But its rather structured nature and Service competitiveness can lead to difficulties in inserting technologies or capabilities which show merit and in some cases threaten legacy programs of record. Today, the Department of Defense fights as a Joint Force, but organizes, trains, and equips as single Services. Due to this critical fault line that must be bridged in our acquisition strategy, it is imperative that transformational capabilities enter our force with the support of all four Services and a method to better our Joint Force. In today's world, the force operates as a joint, interdependent force however, our ability to procure systems and capabilities as

well as force structure continues to remain somewhat stove piped and is probably best characterized as deconflicted. If our acquisition strategy fails to embrace the introduction of transformational initiatives that enter the stream through experimentation or other non-traditional means, then changes to US Law may be required to ensure our success in transforming the force. There is however, a potential for peaceful coexistence of jointly developed experimentation initiatives and existing Service programs of record.

To attain peaceful coexistence of jointly developed initiatives, evaluation of the transformation and acquisition efforts of the Department of Defense and the support of those efforts to the Chairman's vision to achieve full spectrum dominance[1] must continually occur. Specifically, an ability to quickly spiral capabilities to the Joint Force in a logical and supportable fashion must exist. In the recent past, several transformational concepts have attempted to make the jump to reality through doctrine or Service programs of record. Unfortunately, the track record of some transformational initiatives has not been stellar and few have successfully changed the way we defend our nation and allies around the world. We must do a better job of putting new capabilities in the hands of our warfighters. The transition from experimentation to sustained program can not have a gap or void. That gap exists today as we experiment and hand off prototype capabilities or concepts to programs of record.

The heart of the gap between transformation and acquisition is caused by the PPBS with a two year Program Objective Memorandum decision cycle. A two year

[1] Chairman Joint Chiefs of Staff, *Joint Vision 2020 – America's Military: Preparing for Tomorrow*, 1-3. Joint Vision 2020 grows the conceptual framework established in Joint Vision 2010. The superiorly informed force moves from four pillars of Dominant Manuever, Precision Engagement, Focused Logistics, and Full Dimensional Protection to a force with Full Spectrum Dominance capabilities prepared for the entire range of operations from peacetime engagement to full scale force on force combat. Joint Vision 2020 continues to shape the transformation of today's force in order to meet the challenges described in strategic national documents.

cycle leaves a fresh start experimental initiative needing two year bridging funds to sustain its continuance prior to attaining funding through the PPBS. Because of this lead time and gap in funding, a new start program spinning out from transformational experimentation has a significant risk of either pausing awaiting funding or worse yet, failing to transition to the hands of the warfighter. In order to establish a better record for concept to capability with respect to experimentation initiatives pursued with an intent to transform the force, a process is model is recommended. This model looks to apply lessons learned through the past decade of work performed at the Joint Experimentation Directorate, US Joint Forces Command.

The Transformation Requirement

Why transform the Joint Force? Transformation is vital to the continued success of our ability to defend the nation. Without transformation, the force runs a significant risk of becoming irrelevant in a complex, changing world. Joint Vision 2010 was the bedrock for Joint Force transformation and although transformation was not used as an action verb within the vision paper, the requirement to move our force to next level in the coming century was very well defined. It laid out the vision for future warfighting capabilities. As a lead document pinning down requirements for the Joint Force as we moved in to the 21st century, Joint Vision 2010 called for development on four operational concepts: Dominant Maneuver, Precision Engagement, Full Dimensional Protection, and Focused Logistics. Joint Vision 2020 quickly followed. Joint Vision 2020 built upon and extended the conceptual template established by Joint Vision 2010 to

guide the continuing transformation of America's Armed Forces.[2] In Joint Vision 2020, the Chairman's vision focused squarely on transformation of the force. The Chairman's guidance and vision led to a robust network of Joint Experimentation and Training venues intended to look at future concepts and offer a potential for transformational growth.

The Joint Staff J7, Joint Experimentation, Transformation, and Concepts Division (JETC) mission statement is to support and facilitate the transformation efforts of the Chairman of the Joint Chiefs of Staff by acting as the primary agent for developing and monitoring the implementation plans for joint experimentation and concept development. JETCD develops the Capstone Concept for Joint Operations and integrates subordinate Joint Operating Concepts, Joint Functional Concepts, and Joint Integrating Concepts.[3] As such, JETCD is tied closely to the United States Joint Forces Command whose four primary roles are: Joint Force Provider, Joint Force Integrator, Joint Force Trainer, and Joint Concept Development and Experimentation.[4] The latter two tasks represent a major engine for change of the force's posture and transformation. It is within these two areas that further investigation reveals a glimpse into the successes and failures of a decade of transformation within the Department of Defense. By evaluating the Joint Staff and US Joint Forces Command's successes to support transformation alongside the Secretary of

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[2] Chairman Joint Chiefs of Staff, *Joint Vision 2020 – America's Military: Preparing for Tomorrow*, 1.

[3] Joint Staff, J7, *Joint Experimentation, Transformation, and Concepts Division Mission*. Close coordination between the Joint Staff, the Office of the Secretary of Defense, and US Joint Forces Command in transformation of the Joint Force is required.

[4] USJFCOM Fact Sheet, *Mission and Strategic Goals*. US Joint Forces Command responsibilities are varied as a Functional Combatant Command, more so than any other of the Functional Combatant Commands. As a Force Provider, US Joint Forces Command supports the on-going operational and exercise needs of the Regional Combatanat Commands while leaning forward in the role of leading Transformation for the Joint Force.

Defense's Office of Force Transformation it becomes possible to highlight those areas requiring further development. Lessons learned here will help those in the future to successfully develop and deliver a transformational capability.

This paper outlines the concept of transformation and its 21st century definition. Transformation has become a buzzword for the Department of Defense, but the practicality and reality of Joint Force transformation define what is important, not whether or not something looks transformational. Furthermore, the ability to get transformational capabilities from the lab to the field in a timely manner is at the heart of the transformation problem. To understand the significant challenge to the Department of Defense in transforming the force, a look at the beginning of our current transformation efforts and the challenges that have been encountered will be discussed. Experimentation efforts and transformational initiatives developed primarily by US Joint Forces Command provides a useful case study and one initiative in particular, exposes a potentially successful process for moving a transformational idea from concept to capability.

The modern era of force transformation is primarily traced to the turn of the 21st century and it is often associated with the capabilities the military has developed since the Al Qaeda attack on the United States in 2001. Practically, the concept began in the 1990s. To bracket the problem, this discussion highlights some of the successes and failures of transformational initiatives originated during the past ten years. A short discussion of current Department of Defense Acquisition policies lays the foundation of US Law which is necessary to understand how the force procures capabilities. Then, a dialogue of the transformation foundation and a brief description of organizations

engaged in development of concept will follow. This dialogue helps to level the playing field and describe the vast array of effort being undertaken by the Department of Defense. After definition of the scope of effort being undertaken to transform the military, focus on a major transformational initiative undertaken by US Joint Forces Command will provide the case study. This case study of several initiatives and their success or failure to transition to Joint Force capabilities gives an adequate report of transformation successes and highlights methods to be followed in future transformation efforts.

In a monumental experiment conducted through the summer of 2002, US Joint Forces Command pushed forward several concepts for transforming the Joint Force. This experiment, titled Millennium Challenge 02, represented the single largest experimentation venue ever undertaken by the Department of Defense. Two years in preparation, run from multiple live and simulation sites, and costing $250 million dollars – Millennium Challenge 02 incorporated over 13,000 persons.[5] Millennium Challenge 02 was the second in a planned series of several Millennium Challenge experiments to be conducted through the years. The size and scope of the series of Millennium Challenge experiments is of less importance than the actual concepts experimented with in 2002 but the robust experimentation plan clearly shows the level of effort applied by the Department of Defense in the attempt to find transformational capabilities and the preparation undertaken for several years in the making leading in to the event. A review of technologies and concepts which have now had the opportunity to mature another five years and enter the Joint Force as new capabilities provides a great case study for review.

[5] General Kernan, "DefenseLink News Transcript 18 July 2002." General Kernan was the US Joint Forces Command Commander during the Millenium Challenge 2002 Experiment.

The Millennium Challenge 02 concepts that proved beneficial have had the opportunity to go through the entire cycle of concept development, experimentation, handoff to a Service sponsor, and incorporation within the Joint Force. Several of the experimental concepts have been employed in the current fight and many have been received with varying emotion by the Joint Force and Services. The struggles and successes of these concepts along with the timelines of their lives provide an excellent review of our defense acquisition process and its strengths and weaknesses as it pertains to moving concepts to capability through joint experimentation. Primarily, this focused study supports the thesis that our jointly interdependent force can transform in a world bounded by our current acquisition law, but only when a dedicated effort or process is applied. Several processes have been developed through trial and error methods with few showing extreme success. A few process models however, have been very successful and a successful model should be incorporated when moving a concept forward as a transformational initiative.

2. Defense Acquisition

Subtitle A of Title 10, United States Code, section 114 provides law describing military acquisition authority. Specifically, this section describes annual authorization requirements prior to defense spending for research, development, test, evaluation, military construction, and material procurement. The Department of Defense is constrained by this law to carry out Defense spending on programs as specifically authorized by Congress. In order to ensure compliance with US Code and the Department of Defense Reorganization Act of 1986, Department of Defense Directive 5000.1 is published. DoD Directive 5000.1 is the Defense Acquisition System.

Acquisition - A Short Primer

The Defense Acquisition System is defined as the management process by which the Department of Defense provides effective, affordable, and timely systems to the users. An Acquisition Program is a directed, funded effort that provides a new, improved, or continuing materiel, weapon or information system or Service capability in response to an approved need. (DoD Directive 5000.1). Defense acquisition procedures and authorities have grown out of necessity to ensure the nation's investment in military technologies, programs, and product support are in line with the goals of the National Security Strategy and properly equip the Armed Forces for defense of the nation. With nearly 4% of the Gross Domestic Product going to Defense spending, it is incumbent upon the Department of Defense to get it right. In the Fiscal Year 2009 Department of Defense Budget Request, $183.8 billion dollars was set aside for Strategic

Modernization.[1] Expenditures of that degree require a significant amount of oversight as is given to programs of record. Acquisition Categories (ACAT) have been established to determine the specific programmatic review process that Program Managers and Milestone Decision Authorities must use through the life cycle of a program. As would be expected, the larger, more complex, and/or higher risk a program, the higher the ACAT level assigned.

The three Service departments within the Department of Defense bear the responsibility for planning, programming, and budgeting of acquisition programs. The resource constrained environment of the acquisition world always leads to program dollar shortfalls which drive tradeoffs, program slips, and compromises for each of the Services.

As a result of the Goldwater-Nichols Defense Reorganization Act of 1986, our military Services have effectively achieved a joint operating capability and have moved over the past decade well beyond the jointly deconflicted level and much closer to a jointly interdependent force. However, our acquisition policies still remain jointly deconflicted at best. Joint experimentation brings a fresh look at the joint warfighting problem without the overhead of Service-centric expectations. Joint experimentation is where the power of "born joint" programs can be realized. Because of this, the Department's developmental joint requirements are likely better developed through the Joint Force than through Service requirements. As such, a level of effort to tie experimentation efforts run out of the Joint Force needs to be tied back to Service acquisition.

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[1] Department of Defense News Release 90-08, *Fiscal 2009 Department of Defense Budget*, 4. The budget report shows the importance of balance in defense spending and the responsibility to the Nation that our force modernization efforts require. The total Presidential Budget request for 2009 is 515.4 billion dollars in discretionary funds for the Department of Defense, a 7.5% increase over Fiscal Year 2008.

Several options exist for experimentation and development of future military capabilities and systems prior to official status as an acquisition program. These Pre-ACAT technology projects include: Advanced Technology Demonstrations, Joint Warfighting Experiments, Advanced Concept and Technology Demonstrations (ACTDs), Concept Refinement, and Technology Development. (DoD Instruction 5000.2). But eventually, these Pre-ACAT programs must move to a program of record for continued support and program tracking within the Department of Defense. These Pre-ACAT technology projects are fertile ground for development of transformational capabilities in today's military.

Pre-ACAT technology programs are conducted throughout the Department of Defense by Combatant Commands, Military Services, Defense Agencies, and contracting companies in support of the Office of the Secretary of Defense. These programs are typically unconstrained from the burden and time lag associated with ACAT programs, most notably driven by the Program Objective Memorandum process of the Military Planning, Programming, and Budgeting System. Because of their relative freedom, Pre-ACAT programs are often able to capitalize on emerging technologies and concepts which often look to change existing joint and Service doctrine. Within Pre-ACAT programs, decision cycles are not required as they are in full ACAT programs. The lack of rigid requirements development and hardware procurement cycles years in advance of delivery to the developmental tester offers extreme flexibility and rapid changing of the system or process to meet the changing requirements in a complex environment. Ultimately however, the transition of desirable Pre-ACAT programs to ACAT programs can be and has proven over the last decade to be problematic. Service cultures and Title

10 requirements to organize, train, and equip as a Service can be counterproductive to acquisition for a jointly interdependent force with requirements established by regional and functional combatant commands and their sub-unified commands.

The Directive to Transform

In the Transformation Planning Guidance, the Secretary of Defense stated his reason for the need to transform. "Transformation is necessary to ensure U.S. forces continue to operate from a position of overwhelming military advantage in support of strategic objectives" (Transformation Planning Guidance 2003, 4). While evolutionary change will always exist, it may not provide the rapid change necessary to maintain the position of the world's premier military force. Through a dedicated transformation plan, the force can chart its own course to transform ahead of the world threats anticipated. In the wake of Al Qaeda attacks on the World Trade Center, the state of our military needed serious review. Having spent decades posturing for combat in a bi-polar threat world between NATO and Warsaw Pact nations, the United States needed to revisit force size, structure, and capabilities. New World Order and the emergence of a quadrant of threats detailed as Traditional, Irregular, Catastrophic, and Disruptive Challenges[2] solidified the necessity to transform to a more mobile and adaptive force. Events that unfolded through the 1990s in Bosnia and Kosovo showed the need for conventional military might but Humanitarian Assistance missions and Disaster Relief were becoming common-place as

[2] National Defense Strategy 2005, 2-6. The Strategy details a Changing Security Environment consisting of: Maturing and Emerging Challenges, Changing Relationships, and Assumptions Framing the Strategy. Maturing and Emerging Challenges is further broken down into the four challenges facing our military force. The traditional challenge is one where the peer competitors are virtually non-existent and the United States has an unmatched conventional combat capability. Adversaries are adapting their asymmetric capabilities in irregular, catastrophic, and disruptive methods. Irregular methods include unconventional warfare. Catastrophic methods involve the use of Weapons of Mass Destruction (WMD). Disruptive methods include technological breakthroughs.

well. Ultimately, combat operations in response to the September 11th attack proved the need for a rapidly deployable force and our posture just wasn't there in 2001.

The Secretary further stated the requirement to transform with three key requirements: It's about changing the way we think about challenges and opportunities; adapting the defense establishment to that new perspective; and refocusing capabilities to meet future challenges, not those we are already most prepared to meet.[3] The Office of Force Transformation has stated the four pillars of force transformation: Strengthening Joint Operations, Exploiting U.S. Intelligence Advantages, Concept Development and Experimentation, and Developing Transformational Capabilities.[4] A robust experimentation plan as identified in pillar number three is a key to success. Ultimately however, development and procurement of capabilities within the Department of Defense must exist in resource constrained and timeline budgeted environment.

With respect to defense acquisition, transformation of the force has to occur inside the PPBS timeline. The Transformation Planning Guidance discusses a path where a Joint Operating Concept is refined and transitions via a transformation roadmap into the front end of the two year PPBS cycle.[5] The ability to transition a capability inside the PPBS cycle is imperative and is the crux of the transformation problem. If a concept is developed, only to then have to undergo the Program Objective Memorandum cycle to

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[3] National Defense Strategy 2005.

[4] Elements of Defense Transformation, 6. The Office of Force Transformation developed the Transformation theme espoused by the Secretary of Defense in the April 2003 Transformation Planning Guidance. The Office re-iterated that Transformation was more than just acquiring new equipment and embracing new technology. Transformation includes how we do business, how we work with others, and how we fight.

[5] Transformation Planning Guidance 2003, 14.. The PPBS cycle is overlayed with the a two year Transformation Cycle. Entry of a Joint Operating Concept occurs at the end of the second year of the cycle and places a fresh start concept into service inside the PPBS timeline.

attain acquisition program status before being funded and supported, it will be dead before it starts. Rather, a bridge to take a concept out of the research and development world and into the operations and maintenance world needs to exist. Transition of an experimental concept which represents a transformational capability continues to be a problem and proves to be one of the most difficult tasks in the concept to capability framework. This is where the necessary bureaucracy of defense acquisition clashes with defense transformation.

Joint Requirements Development

When Defense Department transformational initiatives are developed jointly from the start, the best chance at solving issues or providing capabilities needed for the joint fight occurs. Our Title 10 construct however, does not lend itself to this born-joint start and more over tends to support our Service-centric acquisition methods which often results in jointly deconflicted but complimentary capabilities. Where we desire to be with acquisition is where we are in operations and that is fighting on the battlefield as a jointly interdependent force. There are several methods to develop requirements jointly and to hand them to the Services for incorporation. One such method is through attaining approval of a joint program by the Joint Requirements Oversight Council (JROC). The JROC determines and recommends programs to be funded by the Services and further developed or refined to support the joint warfighting effort. Furthermore, the JROC establishes the Functional Capabilities Boards which oversee joint requirements

development.[6] These Functional Capabilities Boards provide the rudder to keep joint programs moving in the direction that supports the Chairman's vision. This direction is critical in the world of transformation with multiple Services, Agencies, and industry working the transformation effort.

[6] Defense Acquisition University (DAU), Defense Acquisition Guidebook, 10.2.3. The DAU mission is to provide practitioner training, career management, and Services to enable the Defense Acquisition, Technology, and Logistics community to make smart business decisions and deliver timely and affordable capabilities to the warfighter.

3. A Big Start for Transformational Concepts

In July 2002, US Joint Forces Command executed the second experiment in a series labeled Millennium Challenge. At that point in time, the campaign plan for the Joint Experimentation Directorate (J9) of U.S. Joint Forces Command dictated a major experiment bi-annually. These experiments were a significant undertaking for the command and were the focus of effort for the Experimentation Directorate.

During this same time period, the Unified Command Plan was being reworked and Joint Forces Command would shortly become a functional combatant command. One of the key tasks to be handed to US Joint Forces Command was to be the lead Agency in the Department of Defense for Joint Concept Development and Experimentation in support of transformation. This task put a great deal of responsibility for future force conceptual development on the Commander and required close integration of all staff elements. In particular, the Experimentation Directorate refined close ties to the Joint Warfighting Center (J7) and Joint Requirements Directorate (J8). These three directorates worked closely on development of concepts, training and documentation, and Joint Force requirements. In support were elements from all other directorates – the J2 in particular providing liaison elements embedded directly in the other three. While the Defense Advanced Research Projects Agency (DARPA), the Joint Staff, and the Services looked at transformational concepts, Joint Forces Command developed several concepts into prototypes for inclusion in Millennium Challenge 02. A few of these concepts have matured and their current status is worth investigating. The names of the transformational initiatives in 2002 were: Standing Joint Force

Headquarters, Effects Based Operations, Operational Net Assessment, Joint Interagency Coordination Group, and Joint Fires Initiative. All concepts but one retained their initial name. Effects Based Operations underwent an initial name change to Effects Based Approach and is now called Effects Based-Based Approach to Operations. Despite the name change, the original concept has not significantly changed.

According to the Deputy Director for the Innovation Group, Joint Forces Command, success in transition of a concept or prototype to a fielded capability requires "Legitimacy and buy-in from the start with a process that solves the military problem."[1] A review of the Millennium Challenge 02 concepts with a brief description of their origins and history through the past decade will give insight into their success to transition. The evaluation of the successes or failures of these transformational initiatives six years after their experimentation debut follows. The evaluation addresses how the Joint Force has embraced the capabilities experimented with and difficulties experienced in moving the new capabilities from concept to the field. Detailed discussion of transition of one – The Joint Fires Initiative – gives insight as an example of how transformation and acquisition merge and often clash. But transition to fielded capability can occur.

Standing Joint Force Headquarters

The Standing Joint Force Headquarters began as a concept intended to create an element within each combatant command, primarily the regional combatant commands, for which the nucleus of a Joint Force Staff could be created. Real world operations

[1] Mr. George Bowers, interview by author, Suffolk, VA, February 15, 2008.

throughout the 1990's following Desert Shield/Desert Storm required establishment of Joint Task Forces and in each of these cases, building effective warfighting staffs was a major undertaking. Some operations were executed better than others, but in all cases, the United States was successful in employing its military power. Unfortunately however, this often occurred at the expense of much hard work and on-the-job joint staff officer training. This is not the preferred method to develop a well prepared joint staff officer.

The Standing Joint Force Headquarters vision was for a standing staff of approximately 56 persons (the number has changed through the years but remains between 50 and 60) capable of plugging in to any established Joint Task Force or becoming a Joint Task Force Headquarters itself. This group of 56 persons would be led by a junior flag rank commander (most likely an O-7) and would not have daily responsibilities within the other directorates of the combatant command staffs. Rather, the Standing Joint Force Headquarters, enabled by several of the other key concepts experimented with in Millennium Challenge 02, would become regional and country experts for areas of concern to the Combatant Commander.

Employment of the Standing Joint Force Headquarters would occur at one of three levels. Employment option one would have the Combatant Commander designate the Director of the Standing Joint Force Headquarters as the JTF Commander and the 56 person staff as his JTF staff. Employment option two would pull the 56 man standing team from within the combatant command staff and plug them into a designated Service three star headquarters. This headquarters would be identified as the Joint Task Force Command and the Standing Joint Force Headquarters augmentation personnel could

deploy forward with the JTF staff or remain in the rear as a reach back capability. In employment option two, the Standing Joint Force Headquarters could act in an advisory role to the heads of the Joint Task Force Staff and report directly to the Corps level commander or be integrated within the staff as directed. Employment option three would keep the Standing Joint Force Headquarters within the Combatant Commander's staff for large scale operations and would provide a ready, trained staff aware of the issues the command would face in execution of a contingency plan.

Effects Based Operations and Operational Net Assessment

A major concept developed to support the Standing Joint Force Headquarters was Effects Based Operations. While most are familiar with the term, and often state that warfighting has always been about effects, this concept truly offered a unique perspective on warfighting philosophy and application of the full range of National Power coordinated through the Joint Task Force. It is hard to speak about Effects Based Operations without also discussing Operational Net Assessment. The two concepts were developed and pursed in a fashion such that an accurate Operational Net Assessment would inform the development of an Effects Based Operational approach. In order to understand second, third, and even fourth order effects attained through application of an instrument of National power – be it a kinetic strike or an information operation – one needs a clear picture of the intended target. A system of systems analysis team within the Standing Joint Force Headquarters develops the core model to support the Operational Net Assessment.

Operational Net Assessment aims to develop a system of nodes and linkages at several layers to understand the potential implications of certain actions and the intended outcomes in order to inform the Effects Based Approach decision tree. This decision tree is designed to give the Commander a clear picture of anticipated reactions and outcomes as a result of friendly force actions. The planning process for application of friendly force actions defines the Effects-Based Approach to Operations.

The Joint Forces Command Effects-Based Approach to Operations Handbook, discusses the need to integrate all elements of National Power.[2] The concept discusses integrating the total power of US Interagency which is categorized across four focus areas: Diplomatic, Information, Military, and Economic. Application of these elements of National Power allows the United States to influence the target as a system by focusing on each of our adversary's interdependent systems which are Political, Military, Economic, Social, Information, and Infrastructure.

Joint Interagency Coordination Group

Realizing the need to integrate the whole of government and provide civilian expertise from other Government Departments and Agencies to the Combatant Commander, Joint Forces Command developed a concept and experimented with an interagency coordination group. According to the Joint Interagency Coordination Group Project Manager, development of the concept began in 2000 in order to inform the

[2] USJFCOM, *Commander's Handbook for an Effects-Based Approach to Operations*, I-1 – I-2.

Standing Joint Force Headquarters on interagency issues.[3] Millennium Challenge 02 provided a robust framework for initial application of the concept.

The Joint Interagency Coordination Group is a combatant command's designated lead organization for the interagency community providing oversight, facilitation, coordination and synchronization of Agencies' activities within the command. It provides each Combatant Commander with a trained and equipped staff element specifically organized to enhance situational awareness of civilian organizations, their relationships within the interagency, and potential contributions to joint operations.[4] In the event National efforts at diplomacy fall short and military action within the Combatant Commander's area of responsibility should become required, the Joint Interagency Coordination Group provides a mechanism to rapidly integrate all facets of Government. This jump start interaction with other Government Agencies is due to the habitual relationships developed between the Combatant Commander's staff and civilian counterparts. These key relationships provide instant access to otherwise hard to attain support. Although funding limitations and personnel staffing challenges within other Agencies and Departments may limit their ability to help attain political-military objectives, the quick start and existing knowledge of issues at hand creates an ability to more rapidly respond than had the Joint Interagency Coordination Group not exist.

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[3] Mr. Phil Kearley, interview by author, Norfolk, VA, February 12, 2008. Mr. Kearley spent his developmental time working interagency issues and engaging in concept development with US Southern Command as well as the US State Department.

[4] USJFCOM, *Pamphlet 6 – Doctrinal Implications of the Joint Interagency Coordination Group*, 5.

Joint Fires Initiative

In response to needs within the Joint Fires community, the Joint Fires Initiative began concept development for Millennium Challenge 02. With the desire to put the most effective weapon on target, the Joint Force Commander needed the ability to task any component commander to employ fires in support of Time Sensitive Targeting. Target prioritization within the fires element established Time Sensitive Targets as the number one target priority for the Joint Force. To rapidly address the number one targeting priority, each of the components' fires elements were required to provide a firing solution, if able, to the commander. A systematic method for showing fires solutions both vertically within the Command and Control chain through Component staffs up to the Joint Force Commander and horizontally across the Components was needed.

The task at hand for the Joint Force required detailed integration of separate Service programs of record which were operating proprietary software solutions for individual targeting and target coordination. Specific examples include two separate and incompatible versions of the Advanced Field Artillery Tactical Data Systems for the Army and Marine Corps; the Land Attack Weapons System, the emerging Naval Fires Control System, and the Theater Mission Planning Center for the Tomahawk Land Attack Missile System for the Navy; The Theater Battle Management Core System for the Air Force, and several other Command and Control software programs with target folder generation capability. None of these systems were designed to be interoperable or to share targeting folders. The Joint Fires Initiative created a method for each of the

Service systems of record to publish targeting information and populate a common data base that each component could access and view separate force targeting solutions.

Through Tactics, Techniques, and Procedures developed for the experiment, the Joint Fires Element of the Joint Force Commander's staff reviewed each of the component fires solution nominations and was able to provide a recommendation to the Joint Force Commander on the best solution for prosecution of the Time Sensitive Target. The joint fires software, which was built through an Advanced Concept Technology Demonstration called the Automated Deep Operations Coordination System (ADOCS), was the nucleus of the information sharing capability and became a key component to the Collaborative Information Environment that the Standing Joint Force Headquarters utilized.

The Joint Time Sensitive Targeting Manger depicted in figure 1 was developed as the collaboration tool within ADOCS. This tool provided visual interaction between each of the fires element in the Joint Force. Several sub-menus within the software were

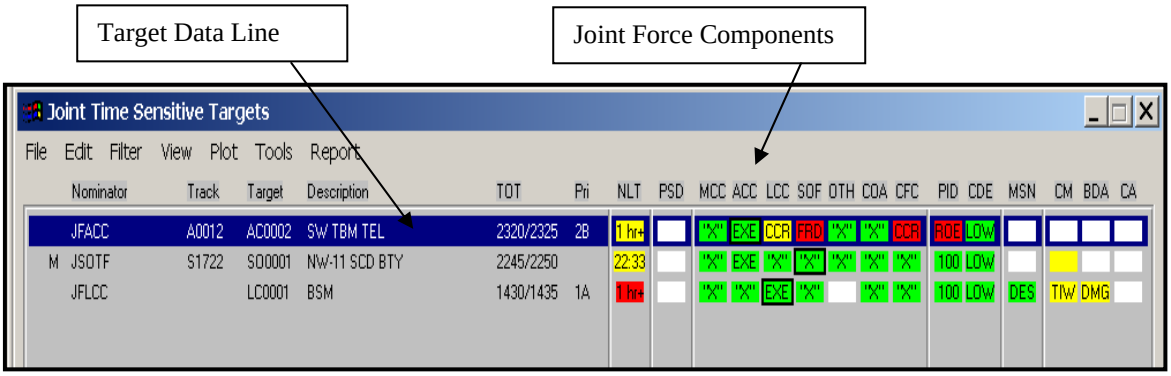

Figure 1. Joint Time Sensitive Targeting Manager. Joint Fires Initiative Block 1 Capabilities Brief.

accessible from the Joint Time Sensitive Targeting Manager which provided the necessary decision making capability such as expected effect for the weapon-target pairing system and collateral damage estimation.

Post Millennium Challenge – The Need to Transition Prototypes

Each of the concepts proved to have merit as the Millennium Challenge experiment concluded. As a result, they were further refined as prototype Joint Force capabilities for the few years following the experiment and are currently in use within the Joint Force with varying levels of success. In order to establish a coherent application of the capabilities, concept maturity and Service component acceptance of these transformational initiatives needed to occur. Through the process of DOTMLPF[5] workshops, Joint Forces Command established the impacts to the force and potential Title 10 requirements issues that would affect the Services as they organize, train, and equip for combat. To ensure Service acceptance of the concepts, the JROC issued Joint Requirements Oversight Council Memorandums (JROCM) directing Service and Joint Force compliance. An example is the JROCM which endorses the DOTMLPF changes recommended for Operational Management of Time Sensitive Targeting.[6]

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[5] Doctrine, Organization, Training, Material, Leadership, Personnel, and Facilities (DOTMLPF). The DOTMLPF framework provides appropriate categories for establishing new capability impacts to the Joint Force across the full range of military force requirements.

[6] Joint Requirements Oversight Council (JROC) Memorandum 158-03. The JROC is comprised of the Vice Chiefs of Staff for the four military Services and is chaired by the Vice Chairman, Joint Chiefs of Staff. Additionally, the JROC oversees the Functional Capabilities Boards established within the Department of Defense. This oversight helps ensure Service acquisition occurs in manner which supports the Joint Force's requirements. Memorandums from the JROC are designed to issue guidance to the Services to comply with those Joint Force requirements.

Prototypes such as the Joint Fires Initiative must transition to a sustained military program of record. The road to transition a transformational capability from an experimentation venue to a sustainable program of record became a significant challenge for Joint Forces Command in the years following Millennium Challenge 02. Without transition, a concept may die on the vine. Capability transition is the key to the nexus between defense acquisition and transformation experimentation. Without a smooth and rapid transition to a Service program of record that becomes responsible for planning, programming, and budgeting for the future of the capability, no new warfighting means exists.

A short review of where the Millennium Challenge 02 prototypes are today follows. To illustrate the deep chasm between experimentation and program definition, a complete look at the transition of the Joint Fires Initiative capabilities contained within ADOCS (now further refined as the Joint Automated Deep Operations Coordination System) will be examined. The Joint Fires Initiative is considered to be one of the more successful prototypes released from experimentation and transitioned to a program of record. It has been in use supporting fires coordination for the combined force fighting both Operations Iraqi Freedom and Enduring Freedom since 2003 and has been used in US Pacific Command theater level exercises as well.[7]

[7] Mr. James Nichol, interviewed by author, Suffolk, VA, February 15, 2008.

4. Concept to Capability – The Difficult Road to Transition

Following Millennium Challenge 02, the success of the concepts supporting the Standing Joint Force Headquarters were readily apparent. But so was the $250 million dollar price tag of the experiment and the significant time and effort required to plan for, execute, and tear down the simulation system employed. Rather than continue on a path for concept development looking out 20 to 25 years and planning for a major experiment bi-annually, the Joint Experimentation Campaign plan was changed under the leadership of the Director, Major General James Dubik, USA. A two path strategy was adopted that included the continuation of concept development but added a prototype development path. Additionally, a Distributed Continuous Experimentation Environment was created which allowed on-going experimentation to occur daily. The Distributed Continuous Experimentation Environment was linked to other experimentation labs and venues throughout the Department of Defense. Use of the experimentation environment allowed refinement of prototypes in a spiral experimentation manner while each of the prototypes showing merit was moved toward transition from experimentation to a program of record.

Millennium Challenge 2002 prototypes – Where they are today

The Standing Joint Force Headquarters concept has been embraced at varying levels through the regional combatant commands. By a Secretary of Defense directive in the Defense Planning Guidance, each regional combatant command was directed to

establish a Standing Joint Force Headquarters by 2005.[1] Exact application was not dictated although something along the lines of the experimental staff clearly was the expectation. Since each command possesses unique warfighting and theater security requirements, exact application is left to the discretion of the Combatant Commander. Some form of the Standing Joint Force Headquarters will be found in each command. US Pacific Command, for example, has successfully integrated a Standing Joint Force Headquarters modeled closely to the experimental version. The Pacific Command Standing Joint Force Headquarters is a key element and has varying tasks based on the three possible levels of employment espoused by the Joint Forces Command model. They are an integral part to the formation of the Joint Task Force delegated by the Combatant Commander for each of the Pacific Command regional plans and the Standing Joint Force Headquarters participates throughout the command in annual exercises.[2]

The Operational Net Assessment and Effects Based Operations concepts were originally developed and inextricably linked, but what followed Millennium Challenge 02 was a slight divergence in their maturity and how rapidly they moved toward Joint Force tools espoused in Joint Doctrine. Within two years of completion of the Millennium Challenge 02 experiment, the Operational Net Assessment concept received approval as a necessary element of the Joint Force's capability as evidenced by the JROCM dictating its application. Effects Based Operations on the other hand, continued maturing and underwent a series of name changes before finally settling in Joint Doctrine. In principle however, the basic form of the concept for both are now integral

[1] Military Review, July – August 2004, 32.

[2] Joint Forces Command Joint Fires Initiative Trip Reports. Terminal Fury 05 Concept Development Conference, Initial Planning Conference, Mid Planning Conference, Final Planning Conference, January through September 2004.

parts of Joint Doctrine and how we plan to execute assigned missions. According to the Deputy Director of the Innovation Group, Joint Forces Command, both concepts have led to new capabilities in use by combatant commands today. The Operational Net Assessment prototype has developed into a joint effort between Joint Forces Command and US Special Operations Command entitled the Global Synchronization Tool, and Effects-Based Approach to Operations laid a foundation for a follow-on prototype called Theater Effects Based Operations. Theater Effects Based Operations became a major joint prototype between the Joint Experimentation Directorate of Joint Forces Command and US Forces Korea.[3]

The success of some prototypes has been greater than others and much of this is largely due to the factors of influence on the Joint Force when viewed through the lens of DOTMLPF. Some elements of the DOTMLPF are easy to attain while others require significant resources in the form of time and money to develop. Principally, one might argue that a few of the highest cost resources are found in Personnel, Material, and Facilities. While Material and Facility development certainly carry price tags that are required to become a part of our force PPBS cycle, Personnel on the other hand may or may not result in a cost of force increase. Probably the biggest complaint heard from the combatant commands with respect to the requirement to establish a Standing Joint Force Headquarters was the fact that no change to the joint manning document came with the requirement to establish the headquarters and so, the organizational change occurred without a relative change in personnel. As is normally the case, other personnel requirements were most likely moved to a lower priority. In some cases, a personnel

[3] Mr. George Bowers, interview by author, Suffolk, VA, February 15, 2008.

change is vital to support impacts to the other elements of DOTMLPF with respect to the new capability.

The Joint Interagency Coordination Group is a classic example of a prototype with large personnel and organizational impacts whose requirements can not be staffed "out of hide." The expertise required by the cell established as the Joint Interagency Coordination Group mandates an expansion of a manning document to include personnel that exist outside the Department of Defense. This is something that the Department of Defense can not influence other than through relationships at the interagency Principles Committee and Deputies Committee. Success in implementing a Joint Interagency Coordination Group too has varied significantly throughout the regional combatant commands but all have realized its importance in light of the nation building, security, and stability operations we have found ourselves firmly entrenched in for the bulk of this new century.

So how does a concept mature through prototype status when grown out of a joint requirement and live to garner the support of the Services who ultimately must fund it and maintain it? This life cycle management, often referred to as "care and feeding", is no small task in a resource constrained environment. There are several potential avenues and one such concept provides a case study of success for concept to capability transition. Regardless, all require a transition plan, with resources, to move from an experimentation venue to a sustained capability. For those requiring material solutions, a transition to a Service program of record is necessary. During the transition period when a prototype leaves the experimentation phase and enters the program of record phase, a gap or break in capability is unacceptable, particularly in a time of war.

The Joint Fires Initiative – A Concept Tested

The Joint Fires Initiative concept to prototype transition represents a case study for the difficult task of moving a concept from cradle to grave within the Department of Defense. The Joint Fires Initiative was built as a software application within the Collaborative Information Environment. The Collaborative Information Environment, established to support and inform the Standing Joint Force Headquarters executing the Millennium Challenge 02 experiment, contained several advanced information technologies and capabilities. The most noteworthy capability within the Collaborative Information Environment was arguably the Information Work Space application which provided the text, voice, and graphical interface for the Joint Force staff to collaborate. Within the Collaborative Information Environment was also the ADOCS application. ADOCS grew out of a requirement generated by Combined Forces Command Korea. In 1996, Combined Forces Command Korea identified a critical requirement to be able to direct coalition operational fires synchronized in near real time. The urgency of the requirement was determined to be best addressed by a Pre-ACAT technology project in the form of an ACTD.

In December 1996, the Deputy Assistant Secretary of the Army for Research and Technology directed the development a concept for a Theater Precision Strike Operations ACTD and in 1997 approved the concept.[4] The task fell on the Joint Precision Strike Demonstration Office. The Joint Precision Strike Demonstration Office (renamed to Joint Programs Sustainment and Development Program Office in FY05) was established at Fort Belvoir, VA in 1992 to address precision strike deficiencies noted in Operation

[4] GlobalSecurity.org fact sheet on Joint Precision Strike Demonstration Office.

Desert Storm. The Theater Precision Strike Operations ACTD grew into ADOCS and became the program to incorporate the Joint Time Sensitive Targeting Manager tested throughout Millennium Challenge 02 as the collaboration tool within the Joint Fires Initiative.

The Joint Fires Initiative developed a conceptual Joint Fires Element within the Standing Joint Force Headquarters. Among other tasking, the fires element became the Commander's Time Sensitive Targeting cell responsible for prosecution of Time Sensitive Targets. The hypothesis of the Joint Fires Initiative, which was later name Joint Fires Initiative Block 1, was that targets could be prosecuted within minutes in comparison to what had often taking hours or days. The established targeting cycle was labeled F2T2EA for Find, Fix, Target, Track, Engage, and Assess. F2T2EA represented the process of time sensitive targeting from front back. The experiment showed that the Engage process prior to the Joint Fires Initiative Block 1 took on average two hours and when the experimental procedures and processes developed through the Joint Fires Initiative were employed, the Engage cycle time was cut down to single digit minutes.[5]

In order to provide the Joint Force Commander with the best possible solution for prosecution of Time Sensitive Targets, each component fires manager was responsible for nominating their best possible firing solution for a target. This timely, accurate information is needed to develop a real-time fires network capable of integrating all Service fires programs of record, and ADOCS provided just that capability. ADOCS was developed as a middleware software program capable of listening on the global

[5] Joint Fires Initiative Block 1 Final Report. During two weeks of experimentation, the Joint Fires Element progressively reduced the kill chain timeline. A steady decrease in time to engage occurred throughout as the Fires Element adapted to the experimental tactics, techniques, and procedures.

information grid for data words from various programs of record and integrating their specific information into one combined software application. Middleware is a term used to define a software program capable of integrating other program databases through translation of their proprietary code. Key capabilities that ADOCS provided the Joint Fires Element included integrating several Service programs of record which detailed command and control and fires information. Figure 2 depicts major programs of record and systems that provided fires information, intelligence support, or command and control data that were fed to ADOCS.

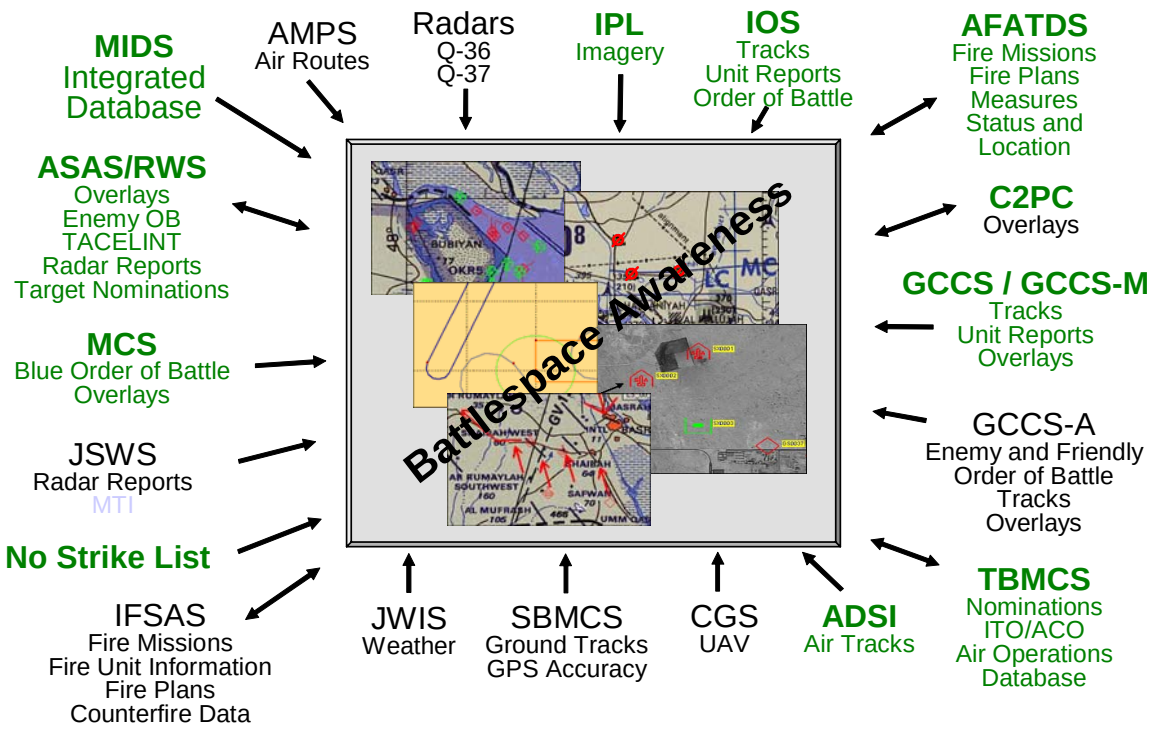

Figure 2. Automated Deep Operations Coordination System Data Fusion. Joint Fires Initiative Block 1 Capabilities Brief.

Each component fires manager had visibility into a Joint Time Sensitive Targeting Manager and the ability to update and post specific firing solutions. Access to friendly and enemy force data through the Global Command and Control System, precision imagery, and fires asset availability were populated at the Joint Force Component level which facilitated the fusion of information. Target data cards were built by each component and accessible by the Joint Fires Element who had primary responsibility for nominating a firing solution to the Joint Force Commander. Factors such as collateral damage estimation, effects, time on target, and asset availability were critical to the decision process and part of the available information in the collaborative environment. Once a nomination was approved by the JTF Commander's Fires Chief, the component designated to execute the mission was established procedurally as the supported commander and the other components were in a supporting role. Battle Damage Assessment was scheduled and included as a piece of the process to ensure a re-attack consideration was made and ultimately to provide intelligence that the fires effect on target had been achieved.

Trial by Fire in Combat

Shortly after the completion of Millennium Challenge 02, the nation found itself fighting Operation Iraqi Freedom. Just nine short months after proof of concept, ADOCS employing the Joint Time Sensitive Targeting Manager developed for the Joint Fires Initiative was tested in combat. Within the opening weeks of Operation Iraqi Freedom, over 300 Time Sensitive Targets were prosecuted by the coalition and more than 1000 other high priority targets were managed within the system.

Joint Forces Command, seeing the immediate success of the program, began a campaign to transition the newly proven capability to a program of record for continual sustainment within the Defense Department. ADOCS had not transitioned from an ACTD in its eight years of development despite its proven effectiveness. The capabilities presented to the Joint Force with the advent of the Joint Fires Initiative placed more capability into an already efficient collaboration tool and brought it to the forefront of the fires community. Between 2002 and 2004, the Joint Forces Command Requirements Directorate worked with the Experimentation Directorate to move the ADOCS-like capabilities that support the Joint Fires Initiative to a sustained program of record. While the prototype capability matured and the Joint Fires Initiative Block 2 experiment began, the Defense Department continued to fund the ADOCS ACTD. Unfortunately, the Time Sensitive Targeting methods delivered by Joint Fires Initiative Block 1 failed to transition to a program of record. Seeing the need to support ongoing Operations in Iraq and Afghanistan, ADOCS passed its end of life period and funding had to be allocated to extend the capability.

As will be shown in the next chapter, the Joint Fires Initiative Block 2 started development with a plan to transition upon completion. As the capabilities of Block 1 and Block 2 were both released, ADOCS moved from an Advanced Concept Technology Demonstration and become a Service program under the US Army Program Executive Office, Intelligence, Electronic Warfare and Sensors.

The intent to transition the Joint Fires Initiative capabilities to a Service program of record represented one of the early attempts to move a concept from the Joint Concept Development world into a sustained joint capability. The Joint Fires Initiative legacy is

one that supports the argument that a better method to rapidly acquire needed capabilities within the Department of Defense and transition to an enduring capability needs to exist. In the interim, a process to transition joint capabilities identified through prototypes should follow a defined procedure that ensures success. The successful transition of the Joint Fires Initiative capabilities occurred as a result of several key aspects: warfighter necessity in Operation Iraqi Freedom, a Joint Requirements Oversight Council Memorandum, and acceptance as a Multi-Service Tactics, Techniques, and Procedures instantiated in a manual written by the Joint Air Land Sea Application Center.[6] Hoping the stars align and a transformational capability takes root is clearly not the desired path to success that one charts down while solving joint warfighting problems and planning for force transformation. As the Joint Fires Initiative matured, a process model to effectively move a concept to capability had to be developed.

[6] Air Land Sea Application Center Multi-Service Tactics, Techiniques and Procedures for Time Sensitive Targeting.

5. Concept to Capability – A Process Model for Transition

Block 2 development of the Joint Fires Initiative began with a detailed model intended to ensure the best chance of success for transition of the transformational prototype. The process model presented here proved successful with the incorporation of Joint Fires Initiative Block 2 capabilities within several existing Service Programs of Record.

The process model

Successful transition of a prototype system or capability begins in the concept development phase. It continues through requirements generation where the actual problem statement will be refined. Once the requirements to be satisfied are identified, they are grouped together into focus areas that give the development team insight into "what nut needs to be cracked." These focus areas become the starting point for potential solutions that range throughout the DOTMLPF areas of the military. Potential solutions are then investigated through several venues and a refined problem statement issued. Experimentation and evaluation in exercises will determine validity of solutions and those capabilities which show merit can transition to Service programs for life long support through the PPBS cycle. The Joint Fires Initiative followed this process model and experienced great success in the transition phase to a sustainable capability in a Service program of record. Joint Forces Command continues to prototype warfighter solutions using the model developed during the Joint Fires Initiative Block 2. According to the Joint Urban Fires Prototype Project Manager, the Joint Fires Initiative process

model proved so successful, it defines the way ahead for successful transition of capabilities.[1]

To ensure precious Department of Defense dollars are spent wisely and a systematic approach to transformation is followed in today's military, this process model or a variation on the theme is recommended. Figure 3 graphically depicts the process from beginning to end in major segments. The sections that follow take a detailed look at the efforts that should be undertaken during those steps.

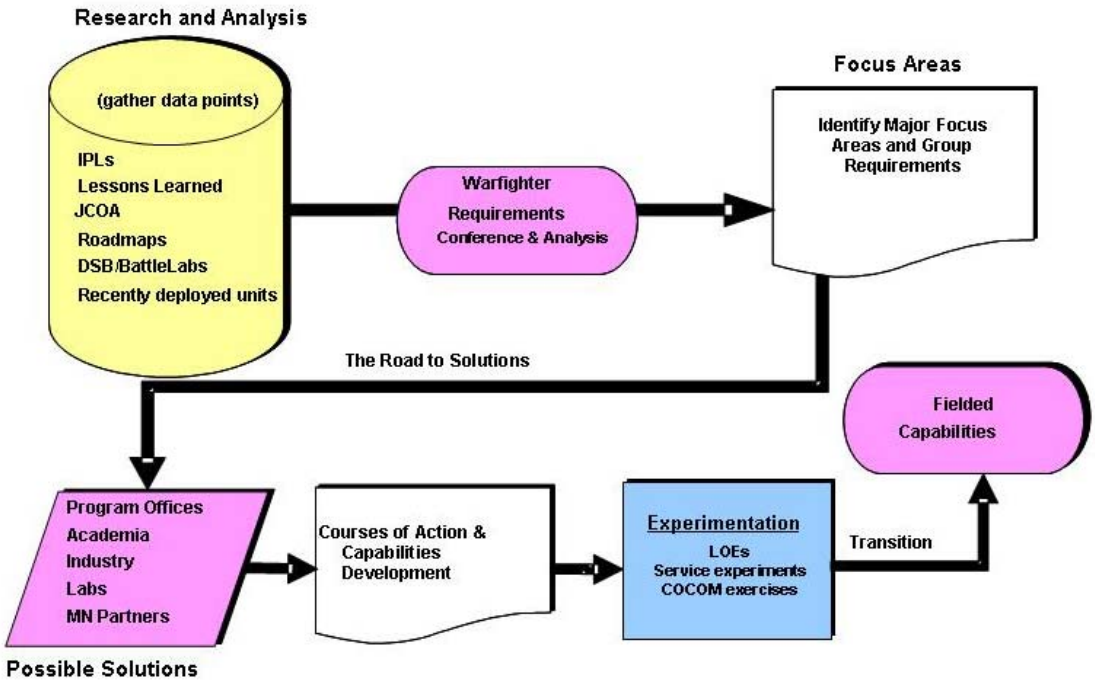

Figure 3. Concept to Capability Transition Model for an Experimental Initiative

[1] Mr. James Nichol, interview by author, Suffolk, VA, November 30, 2007.

Research and Analysis

Key to the success of a transformational initiative is proper problem identification. The Association of the United States Army identified that a goal is to improve the process in order to build a product that has a higher probability of meeting the user's needs in a complex environment.[2] A theory of the warfighting need will likely exist within Battle Labs or Experimentation Directorates but that need must be vetted and shaped. In order to establish the validity of a joint requirement, proper research and analysis must occur. A multitude of data sources exist that define problem statements and validation of those problem statements is absolutely necessary. Combatant Commanders submit joint requirements through the Integrated Priority List (IPL). This list will often have Area of Responsibility (AOR) specific requirements within it but there also may exist problem statements or requirements for capabilities that range across combatant commands and Services. In order to understand the joint warfighter problem in whole, a synthesized list of priorities within the combatant commands must be assembled and reviewed. The Integrated Priority List is a starting point but may often need finer detail which can only come through detailed study and close cooperation with the submitting combatant command.

The Integrated Priority List is a vital piece to joint requirements or needs as the Combatant Commander looks through the challenges in the AOR but it is only a short list of needs for the Joint Force as it looks to transform in order to face the challenges of the future. Lessons learned cells within the Services are a vital point of infusion to the joint problem. Their databases must be reviewed and often times, more than one Service will

[2] The Evolution of the Pentagon's Strategic Warfighting Resource and Risk Process, 13. Volume number 64 of The Land Warfare Papers, published by The Land Institute of Warfare details the difficulty in achieving balance in defense acquisition in a complex changing world.

have similar lessons learned. Lessons learned databases are one Service specific point of interest for framing potential joint problems and so are Service mission needs statements. These mission needs statements will generally pertain to Service specific problems but when taken in context of the joint problem, they can be combined for efficiency of effort and optimized expenditure of Defense Department funds. A classic example is the development of radio communications capabilities that occurred through the second half of the twentieth century. While ground forces were improving low band VHF Frequency Modulation (FM) transmitters that broadcast in the 30 to 88 Megahertz range, aerial platforms were developing radios in two different spectrums. High band VHF airborne radios using Amplitude Modulation (AM) working in the 118 to 132 Megahertz range developed wide use within the US Air Force and civil aviation. Meanwhile, Naval Aviation pursued development of the UHF radio spectrum with operation in the 225 to 400 Megahertz range using both Amplitude and Frequency Modulation. Although each design point has its advantages and certainly each element of the Joint Force found their solution appropriate to their need, little interoperability was occurring and what resulted in the late part of the century was a very limited ability to communicate between the forces.

Our future in joint acquisition has moved far beyond this simple example, but technologies and doctrinal approaches to warfighting still have Service barriers that need to be broached. Service needs statements and lessons learned provide a valuable insight into joint problems that need to be addressed as the force transforms, particularly when viewed through the lens of the joint warfighter as opposed to that of the Title 10 equipper. Observing Service lessons provides a source list of potential force capability

shortfalls but more effectively, as we look for Joint Force solutions in the road to transformation, observation of joint lessons learned can deliberately identify joint needs such as the simple radio example of joint interoperability.

Shortly after the country entered the Global War on Terrorism, the Joint Center for Operational Analysis (JCOA) was established at Joint Forces Command. In its early days, during the combat operations phase of Operation Iraqi Freedom, JCOA was established as the Joint Center for Lessons Learned. Its early name identifies the early mission statement. Established by direction of the Secretary of Defense, JCOA began observing joint lessons. Upon activation, several officers from across the directorates of Joint Forces Command, deployed to the US Central Command Headquarters Forward in Qatar. The majority of the team was comprised of members from the Joint Force Training Directorate (J7) and the Joint Experimentation Directorate (J9). They were assembled with the specific task to collect lessons and report back to the Commander in order to provide a rapid report on Joint Force capability shortfalls. As JCOA matured, their mission statement was refined. Currently, the mission of JCOA is to inform the transformation of the Joint Force by producing compelling recommendations for change derived from direct observations and sound analysis of current joint operations.[3] This center provides real-time issues to the Joint Force with a need for immediate solutions that enhance our near term warfighting capabilities.

Another source of joint requirements and capabilities gaps exists within the combatant commands, and these requirements are often tracked on what are called

[3] US Joint Forces Command, Joint Center for Operational Analysis Mission Statement. JCOA continues to gather lessons learned from Operations on-going throughout the world. JCOA has become a significant source of valuable Joint Lessons Learned and provides a robust capability to support Joint Force Transformation.

"Roadmaps." These roadmaps are designed to ensure the staff sections within the command have a focus of effort. Often, the roadmap will describe in significant detail what is contained at the broad level of a Integrated Priority List. A roadmap is designed to find synergistic efforts within the Joint Staff or a combatant command and to ensure the staff sections are working toward a coordinated goal. Often, roadmaps will cut across functional capabilities areas. As an example, development to increase capabilities within the Command and Control discipline of the Functional Capabilities Board may have an impact on the requirements being investigated by the Force Application Functional Capabilities Board. The need to command and control fires may share similar needs with the requirement to command and control logistics. Each Functional Capabilities Board is constrained to cross matrix ideas to ensure harmony of effort and a roadmap ensures this it happens. Inspection of a command's roadmap will identify those areas in need of deliberate experimentation or capabilities demonstration.

Agencies outside of the active Joint Force and in some cases outside of the Department of Defense can provide a wealth of information and assistance in scoping a joint warfighting problem to be addressed. Within the Department of Defense, the Defense Science Board is chartered to solve warfighting technological problems. Their charter states,

> "The Board, under the provisions of the Federal Advisory Committee Act of 1972, as amended, shall provide the Secretary of Defense, the Deputy Secretary of Defense, the Under Secretary of Defense for Acquisition, Technology and Logistics, the Chairman of the Joint Chiefs of Staff and, as requested, other Office of the Secretary of Defense (OSD) Principal Staff Assistants, the Secretaries of the Military Departments, the Commanders of the Combatant Commands, independent advice and recommendations on scientific, technical, manufacturing,

> acquisition process, and other matters of special interest to the Department of Defense."[4]

According to the Defense Science Board charter, the board does not advise on acquisition or procurement matters for the Department of Defense, but rather it researches problems of technical or complex nature in science or manufacturing related areas. One main mission is to identify applications and technologies which will strengthen the ability of the Department of Defense to provide National Security. Other entities working solutions to joint warfighting matters include Agencies such as the Defense Advanced Research Projects Agency (DARPA), the Institute for Defense Analyses, and the Service Battle Labs. Outside the Department of Defense, many defense contractors are using Internal Research and Development (IRAD) dollars coupled with Defense start up dollars to look for conceptual and technical solutions. With respect to the Joint Fires Initiative, the Mitre Corporation in McLean, Virginia ran a series of projects titled: TST SIMEX, which stands for Time Sensitive Targeting Simulation Exercise. TST SIMEX looked to solve the very nature of problem that the Joint Fires Initiative was after. Through collaboration, both programs were able to better their understanding of the joint problem.[5]

Arguably, the most important input to defining a joint problem which leads to solving the right warfighting issue is capturing the lessons from recently deployed units. While certainly this discussion could be placed in the opening of the section which

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[4] Defense Science Board Charter

[5] Joint Fires Initiative Block 2 Trip Report, February 2004. Mitre was contracted by the Department of Defense to investigate the potential for decreasing the kill chain timeline through increased persistent ISR. The efforts undertaken by the series of TST SIMEX events were complimentary to the efforts undertaken by the Joint Fires Initiative.

looked at the lessons learned maintained in places such as the Center for Army Lessons Learned (CALL) or the Marine Corps Center for Lessons Learned (MCCLL), this perishable data is significantly different. A center for Lessons Learned is a repository which has great value and captures the data pertinent to on-going exercises and operations. Unfortunately, there is an element of lag time while the centers validate and publish the lessons. By capturing the lessons in parallel with the Service centers, the joint community will be able to filter and apply necessary effort in parallel and for comparison to Service experimental plans. This provides an alternate view point and often captures joint integration issues that could possibly be dismissed by a Service as something the Service can not directly influence (or at least not in a timely fashion). In the case of the Joint Fires Initiative, war fighters that participated in Operation Iraqi Freedom I and II from Army V Corps, I Marine Expeditionary Force, 9th Air Force, and NAVCENT were present at the requirements conference to validate the list of lessons learned and inputs from Combatant Commander's Integrated Priority Lists. As the proper joint problem to solve is being evaluated, these inputs are invaluable and lead the study of a transformation capability to the next step in the process which is identification of the proper major focus area. Along with identification of the major focus area, grouping of joint requirements occurs. This ensures a synergistic effort for requirements that can be exploited.

Warfighter Requirements Conference

In the fall of 2003, the Joint Experimentation Directorate hosted a requirements validation and development conference to refine the list of 63 joint fires related problem

statements that had been developed through study of Combatant Command Integrated Priority Lists, Service and joint lessons learned, and warfighter experiences from recent operations. Attendees included active duty military, defense contractors, Service personnel from the Battle Labs, and Government contractors from across the joint fires community. In addition, representatives from the National Geospatial-Intelligence Agency (NGA), the Defense Information Agency (DISA), the Army Training and Doctrine Command (TRADOC), the Marine Corps Combat Development Center (MCCDC), the Naval Surface Warfare Center (NSWC), the Naval Undersea Warfare Center (NUWC), Ft. Sill Artillery School, the Air Force Command Control and Intelligence Surveillance Reconnaissance Center (AFC2ISR), Air Combat Command, Fleet Forces Command, and Marine Corps Forces Atlantic (now called Marine Corps Forces Command) to provide expertise in requirements refinement and real word capabilities needed.

The list of 63 requirements identified as current warfighter joint fires issues were grouped in six problem areas: Common Operating Picture; Intelligence, Surveillance, Reconnaissance; Targeting; Multi-level Security; System Requirements; and Battle Damage Assessment. The requirements were then further sorted and laid upon the Joint Fires Immediate/TST targeting timeline frame work of Find, Fix, Track, Target, Engage, and Assess model to group and prioritize them for future evaluation. In order to mitigate schedule, budget, and risk, the Joint Fires Initiative requirements development conference results were briefed to the Joint Experimentation Director to gain final guidance on the experimentation focus area. The Director indicated the primary focus needed to be providing the Joint Force Commander and his component commanders the ability to

employ the weapon of their choosing at the time and place of their choosing.[6] To this end, the decision was made to capture the majority of requirements as they pertained to the engagement phase and to include the processes prior to and directly after the engagement phase. The requirements grouping is depicted in figure 4.

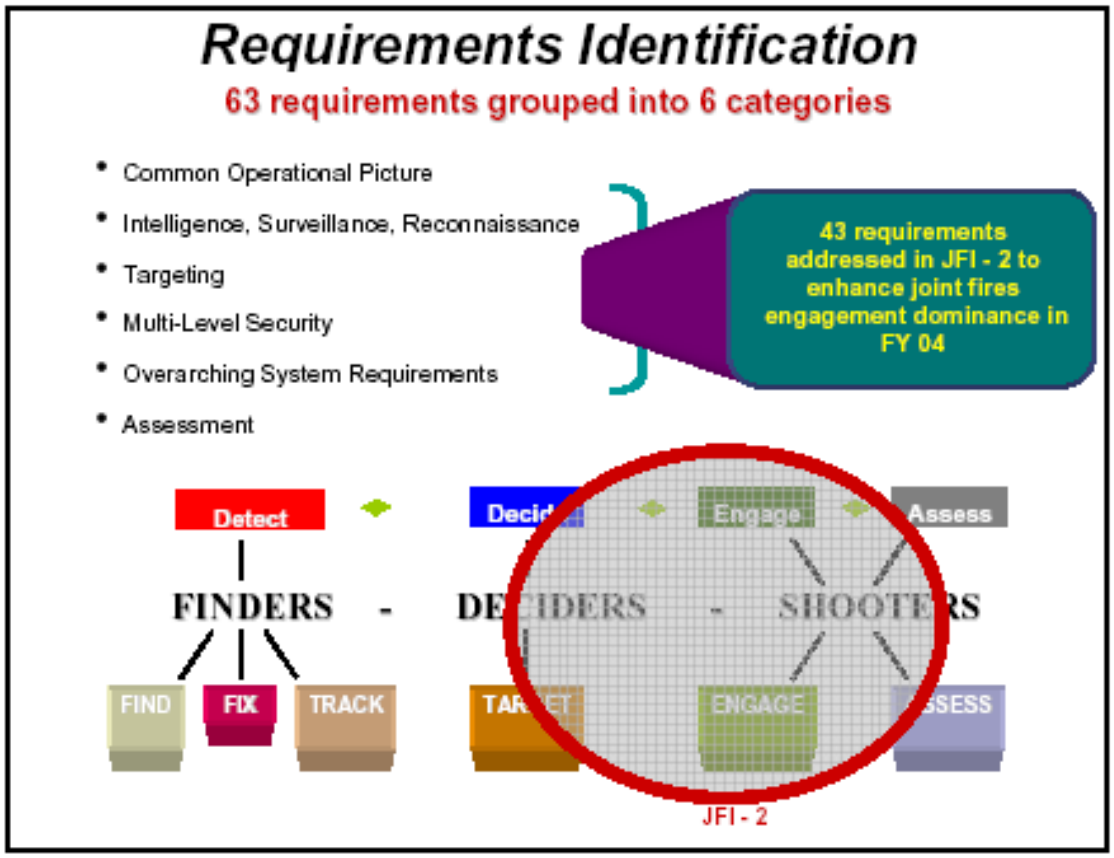

Figure 4. Joint Fires Initiative Block 2 requirements grouping. Joint Fires Initiative Block 2 Capabilities Brief.

[6] US Joint Forces Command Experimentation Campaign Plan. The Experimentation Campaign Plan defines priorities for experimentation within the Joint Experimentation Directorate.

Focus Areas

For the Joint Fires Initiative, step three in identifying and solving a joint war fighting problem was development of the proper focus area. Coming on the heels of the successes of the Joint Time Sensitive Targeting Manager developed for inclusion in Millennium Challenge, further exploitation of the timeline for a target kill chain appeared to surface as a major joint warfighting issue. The Find, Fix, Track, Target, Engage, and Assess timeline construct for prosecution of High Payoff and High Value Targets (Immediate Target Set) provided the ideal grouping construct for joint warfighting issues as they pertained to Joint Fires. From there, a focus purpose for the Joint Fires Initiative Block 2 was developed.

The major experimentation problem to be addressed focused on the ability to improve the operational level management of immediate targets by providing commanders the ability to employ the weapon of their choosing at the time and place of their choosing.[7] This major focus area was developed at the guidance of the Director of the Joint Experimentation Directorate after analysis of the Service and joint fires problems. The focus area was significantly shaped by the war fighter requirements conference which ensured the proper area of development. In the case of the Joint Fires Initiative, grouping of requirements ultimately lead to the development of "Quick Wins" for the Joint Force. These Quick Wins became the prototype capabilities to be transitioned to programs of record. They will be discussed further in section on Experimentation as they became the basis for the Joint Fires Initiative experiment.

[7] US Joint Forces Command, *Joint Fires Initiative Block 2 Final Report* , 1.

Technical Solutions

A major issue with technical solutions intended to provide transformational capabilities is duplication of effort. Too often, a joint problem is being investigated and solved by more than one entity. Not only does simultaneous experimentation cause wasteful use of precious resources, it runs the significant risk of developing differing solutions. In most cases, differing solutions will solve the same warfighting problem but may solve the problem in two distinctly different manners. A potentially worse outcome is development of two different solutions that do not become jointly interdependent and interoperable. In order to avoid duplication of effort, a Joint Force coordinated approach to experimentation in support of transformation is required.

One of the most significant considerations to development of transformational initiatives is to ensure new capabilities are developed from ground up with the Joint Force of the 21st century in mind. Service programs do an excellent job of considering other Service requirements during their development phase but too often will look to solve Service specific problems as they relate to the entire joint fight rather than solve joint Service problems as they relate to the joint fight. One such example of success is the Joint Direct Attack Munition (JDAM) developed by the JDAM Joint Program office (USN and USAF) and Boeing Aerospace. Few Joint Program Offices exist however, and ensuring joint development is what Joint Forces Command brings to the table. The command is able to provide a fresh look perspective across the Joint Force without regard for Service specifics. This is the power that is unleashed through a properly focused joint training and experimentation program and the main point of effort with how the construct of the Joint Fires Initiative Block 2 approach occurred.

With the exception of US Special Operations Command, very limited procurement occurs within the Combatant Commands. Procurement by Services rather than the Joint Force is by design as the Services are tasked by Title 10 of US Code to organize, train, and equip. But as an almost diametrically opposed task, the force will not deploy and fight as a Service, but rather under the construct of a Joint Force established out of one of the regional combatant commands. To this end, any transformational capability that originates out of the Joint Force will have the onerous task of being incorporated into an existing Service program of record or become a fresh start program of record in order to be sustained through its life cycle. For non-material solutions this can be as easy as establishing joint and Service doctrine. In other cases, it may require on-going resources and sponsorship such as a computer based software system or a hardware solution.

The Services that sponsor a Joint Force capability requiring on-going operations and maintenance funds will be required to make hard decisions on priorities during each Program Objective Memorandum submission. This opposing concept of spending money on joint matters vice Service matters can lead to the Service picking its own equities over the greater Joint Force specific requirements. Furthermore, the new capability will not only need to be sustained through its life cycle but will also incur enhancements and further research and development dollars. The best solution the Joint Force can hope for is to find a capability that a Service believes its equities are at least equal to, if not greater than the remaining Joint Force equities. To address these concerns, the development process of a transformational experimentation capability has to have buy-in from the start

from the Services that will ultimately have the task of picking up the pieces and sponsoring the new capability as a sustained program of record.

To do this, the Joint Fires Initiative engaged in dialogue with all four Service fires and command and control centers of excellence as well as the Service Program Managers of the specific programs to understand where they were headed and to help shape their future development. The aim was to coordinate the efforts of various Department of Defense fires and fire support initiatives to develop a single jointly interoperable set of functionalities and processes from operational to tactical levels.[8]

The Joint Fires Initiative looked at three different methods with respect to Service program development in support of Joint Force requirements. The first was to investigate how a specific Service felt it could scope and solve the joint capability desired and then fund that Service to develop the capability – the Service developed solution. The second was to look at an existing program of record within a Service and shape its development as defined by the joint requirement, but through funding provided to the Service – the pay for services method. The third method was to engage an independent contractor to develop a solution which would then need to be incorporated at a later date within a Service system – the jointly developed solution. Also included in this approach was an effort to evaluate the on-going development of two separate and distinct programs aimed at solving nearly 80-90% of the same problem.

[8] US Joint Forces Command, *Joint Fires Initiative Block 2 Final Report*, 1. No single Fires roadmap existed within the Department of Defense and focusing the management of fires and fires control system across the Joint Force was the primary concern. Each Service system was being developed with very limited integration for Joint Force interoperability despite the rapidly changing method of Joint Warfare and interdependency. Sharing of Service fires and command and control information was the key task to create rapid dominance in the Fires community.

Major stake holders in the development and solution of joint fires related issues included all four Service doctrine centers and several programs of record. Engagement of each of these entities became the focus of effort for the Joint Fires Initiative. Having seen the difficulty in transitioning a capability from experimentation to a sustained program of record with Block 1 capabilities, the Joint Fires Initiative team felt that engaging existing programs with the transformational initiative on the front end of development would offer the best possibility for buy-in on the back end.

Existing fires programs of record included the United States Air Force Theater Battle Management Core Systems managed at Hanscom Air Force Base, Massachusetts; the Advanced Field Artillery Tactical Data System managed at Fort Monmouth, New Jersey; and the Naval Fire Control System, which in 2003-2004 was in the development stage at the Naval Surface Warfare Center, Dahlgren, Virginia. These three systems represent the major focus of all three Service Departments with respect to fires system development. Others engaged in the joint fires problem set included the on-going ACTD for ADOCS and the Web Enabled Execution Management Capability under development by the Lockheed Martin Mission Systems for the US Air Force. The Web Enabled Execution Management Capability began development with the intent make joint fires collaboration faster and easier for joint commanders prosecuting Time Sensitive Targets.[9] With regard to that mission statement, the Web Enabled Execution Management Capability served to duplicate many efforts undertaken and already solved through ADOCS. Unfortunately, the Joint Time Sensitive Targeting Manager capabilities embedded within ADOCS had failed to transition to a program of record. Recall that

[9] Web Enabled Execution Management Capability Fact Sheet.

ADOCS was developed as middleware to merge together in one common application, many of the fires and command and control systems needed by the Joint Fires Element to rapidly and collaboratively solve the Time Sensitive Targeting problem.

The Web Enable Execution Management Capability had the aim to do what ADOCS could not do from the start; and that was to be jointly interoperable and approved by all Service programs of record to write back to Service databases. Additionally, the Web Enabled Execution Management Capability was to be designed with the ability to access its databases through limited bandwidth networks. This in effect, would give the joint war fighter access to other Service fires solutions information and additional key aspects such as battle space deconflicton information. In a network-centric fires world, the ability to draw this information from anywhere on the battlefield with limited bandwidth would prove to be a truly transformational capability.

In design, the capabilities developed in support of the Joint Fires Initiative Block 1 where to transition to a program of record; either new or existing. The Web Enabled Execution Management Capability was tasked with the requirement to migrate a Joint Fires Initiative-like capability for Time Sensitive Targeting into a program of record.[10] What was actually developing, unfortunately, was a turf battle for legitimacy in the joint fires world between ADOCS and the Web Enabled Execution Management Capability.

As a valuable aside to joint experimentation, the ability to evaluate the pros and cons of various systems under development in a constrained laboratory environment also exists. Furthermore, understanding the merits of both procurement programs and working toward a joint ideal with respect to both is actually transformation in itself.

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[10] US Joint Forces Command, *Joint Battle Management Command and Control Roadmap*, 111.

Breaking down the Service barriers and more importantly, the proprietary barriers between defense contractors working on separate Service programs becomes a meaningful task. The Joint Fires Initiative provided a venue to do just that. And part of the experiment became an evaluation of interoperability between the two programs. As the Web Enabled Execution Management Capability had the task to plug in and take over in the joint fight such that no loss of capability would exist when the life support to the ADOCS ACTD was finally removed, this interoperability became a key component and a major focus of effort and evaluation for the experimentation venue of the Joint Fires Initiative Block 2.

In addition to Service fires programs of record, the Joint Fires Initiative engaged several other elements including the Service battle labs and industry through existing defense contractors as well as fresh start contractors. In some cases, existing solutions to current problems were already under development or study and in other cases, industry partners looked at current capabilities to determine a quick solution. The 43 requirements identified for experimentation in the Joint Fires Initiative Block 2 where distributed throughout the Services, academia, and industry through a series of visits. As a result, twelve individual but integrated capabilities were identified as possible experimentation capabilities to address the forty three requirements. These twelve capabilities became known as the Joint Fires Initiative Block 2 "Quick Wins."[11] Assignment of development responsibilities was issued to the various entities engaged and their supporting tactics, techniques, and procedures developed in the Courses of Action and Capabilities Development step.

[11] US Joint Forces Command, *Joint Fires Initiative Block 2 Final Report*, 3 – 6.

Courses of Action and Capabilities Development

All four Services engaged in the development of the twelve Quick Wins for the Joint Fires Initiative. The US Army and US Marine Corps had equities in the Advanced Field Artillery Tactical Data System; the US Navy and US Marine Corps had equities in the Naval Fire Control System; and the US Navy, the US Air Force, and the US Marine Corps had equities in the Theater Battle Management Core Systems. The Theater Battle Management Core Systems program office was deep in development of transitional capabilities to the Web Enabled Execution Management Capability and their ability to experiment was best laid in the Web Enabled Execution Management Capability Program Office. As such, the Web Enabled Execution Management Capability became the third major program of record for the experiment.

Ten of the twelve identified Quick Wins were to be developed inside of existing program of record capabilities. This would allow experimentation of the new capability along side of using existing warfighting tools in the field. Additionally, success in an experiment would mean no further research and development, or in the worst case, minimal further research and development investment to get a capability into a Service program of record. Not only would this save precious dollars, more importantly, it would cut two years off the acquisition timeline to indoctrinate the capability. The only issue left for concern would be sustainment to bridge the gap until Program Objective Memorandum inputs could become real funding.

One Quick Win, development of a single targeting database, was outside the purview of existing programs of record and was developed independently by the Naval Surface Warfare Center, Dahlgren, VA. To mitigate risk with programs of record,

collaboration between engineers working the Naval Fire Control System and engineers developing the single targeting database ensured interoperability. Finally, a third development method was tested through the Quick Win identified to provide a Cross-Service Weapon Target Pairing utility. Development of this Quick Win was handed to an industry partner who was currently working other experimentation venues with the Web Enabled Execution Management Capability and the Advanced Field Artillery Tactical Data System. It provided valuable insight to the ease (or difficulty) of transition for a capability developed outside of an existing program of record. Cross Service Weapon Target Pairing was designed to give cross Service (or function) insight to adjacent component commanders. Its relative merit proved extremely useful but as might be expected, conceptually it met with some resistance.

Alongside the software development effort for the Joint Fires Initiative Block 2 Quick Wins, the joint fires team developed the supporting tactics, techniques, and procedures to employ these tools. These tactics, techniques, and procedures were developed to experiment with the notion of component operational level fires executed cross-border. As an example, a High Payoff Target (HPT) in the Land Component Commander's (LCC) Area of Operations that the Land Component chooses to pass to the Maritime Component Commander (MCC) in a collaborative fashion, and for Maritime Component execution in support of the Land Component. This target sharing ability would allow the supported commander to apply a non-organic weapon system that either has a better expected effect on target or possibly that is more readily available in theater.

In order to appropriately test these new tactics, techniques, and procedures and the information sharing material solution, a robust experimentation network was required.

Without an environment that most closely represented real scenarios, no validity to any experiment can truly be recognized. The success of the experimentation to operational use model followed by the Joint Fires Initiative Block 1 offered insight in to a suitable roadmap to transition. As such, a robust, three phased experimentation timeline was developed for validation of the Joint Fires Initiative Block 2 capabilities.

Experimentation Venues

The Joint Fires Initiative Block 1 capabilities became a reality for the joint warfighter through a fortunate sequence of events that followed from initial spiral development and testing and into an experimentation venue. But no one could have forecast the sequence of events that would put the capabilities of the Joint Fires Initiative Block 1 to play for US Central Command in Operation Iraqi Freedom in the spring of 2003. As luck and timing would have it, several years of development and planning for an experiment were successful, but application in the field just fell in the project's lap. This sequence however, provided valuable insight into what one method could be to ensure proper development, experimentation, and transition of a capability. According to the Deputy Director, Joint Forces Command Innovation Group, "Two iterations of process development from the Joint Fires Initiative Block 1, through Block 2, and into the Joint Urban Fires Prototype has refined the prototype development process."[12]

From the beginning, a Joint Fires Initiative Block 2 roadmap was developed. It is shown in figure 5. The premise is that initial capabilities need to be tested in a structured

[12] Mr. George Bowers and Mr. James Nichol, interview by author, Suffolk, VA, February 15, 2008.

environment. A Limited Objective Experiment (LOE) provides the dedicated venue to ensure proper testing and evaluation of all new capabilities. Following a structured and scripted experimentation venue, actual test in a free play environment must occur. This ensures the capability stands up to the rigors of what a

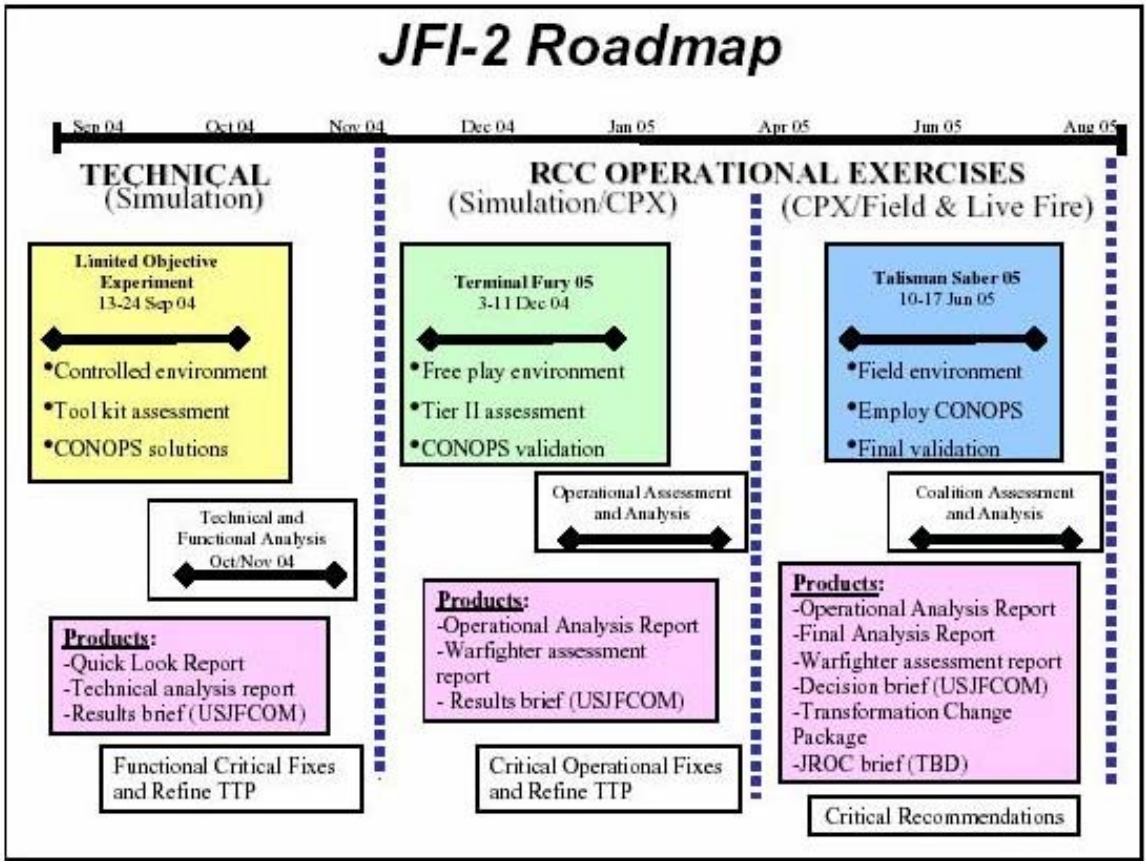

Figure 5. Joint Fires Initiative Roadmap. Joint Fires Initiative Block 2 Final Report.

human might throw at it and gives an opportunity to refine procedures and capabilities that have merit but need further development. Lastly, a live field event provides a true test where environmental factors and real world issues can come in to play. Furthermore, the warfighter can develop a true sense of usefulness or further exploit areas for follow

on development. A graduation exercise such as this can solidify a capability's right of passage and will instill confidence in the joint warfighter.

Each venue provides a unique set of challenges and a wealth of opportunities in the development of the transformational capability. The biggest challenge to a Limited Objective Experiment is to ensure that the proper stimulus is developed and that scenario injects appropriately stress the new capabilities under development. This can often be more of a challenge than it appears on the surface. The hardest part of transformation is trying to know or predict the state of something that you don't know. A new method or capability in the hands of a warfighter will force an enemy combatant to react differently in an attempt to nullify or exploit that new capability. This uncharted territory is vital to understand if the new capability under test is to truly be evaluated. But still, a very scripted environment with control variables that can be reset for retest has to exist. Without tight control, free play will likely cause the experimenter to miss out on several key measures of effectiveness necessary for the evaluation to be considered a success. For the Joint Fires Initiative, a Limited Objective Experiment run completely on simulation but employing the transformational tools and procedures was executed in the Joint Experimentation Lab of Joint Forces Command. The Limited Objective Experiment represented a smaller but equally important step to development in comparison to the grand Millennium Challenge 02 experiment. Furthermore, the Limited Objective Experiment was conducted with a price tag that represented about 1% the cost of the Millennium Challenge experiment – and that figure included software and tactics development. By taking advantage of existing Service labs' experimentation venues as well, the Limited Objective Experiment was run from five individual sites. Conducting a

distributed experiment across several labs saved significant cost in set up and tear down of a grand experimentation venue, kept participant travel expenses to a minimum, and allowed the Services to exercise their specific training events embedded within the experiment. Other sites linked to the Limited Objective Experiment were the Naval Surface Warfare Center Experimentation Laboratory in Dahlgren, VA; the Naval Undersea Warfare Center in Newport, RI; the Air Force Transformation Center in Langley AFB, VA; and the Army's Depth and Simultaneous Attack Lab in Fort Sill, OK.[13]

In order to fully test the Joint Fires Initiative Block 2 capabilities and measure their effectiveness in a free play environment, a major theater level exercise was selected. Early in the development of Joint Fires Initiative Block 2 capabilities, the US Pacific Command engaged and partnered with Joint Forces Command Joint. The Pacific Command's annual Terminal Fury exercise provided an excellent venue to stress the new capabilities to be tested. With the Combatant Command staff focused on a single event, a Major Subordinate Command as the Joint Task Force Commander, and the functional component commanders operating between sites ranging from the west coast of the United States throughout the Pacific area of responsibility, this event allowed for collaborative, distributed target and information sharing test. Terminal Fury permitted the components to exercise the new tactics, techniques, and procedures for prosecution of scenario based immediate target sets. The real world constraints of the net-centric battlefield and human staff officer actions were tested to the limit.

[13] US Joint Forces Command, *Joint Fires Initiative Block 2 Final Report*, 6-7.

The final phase of the three part experimentation campaign put the new prototype capabilities showing merit to the test in a field exercise involving live fire systems. Talisman Sabre, a biennial exercise between the Australian Defence Force and the United States, is a major training exercise for the US Seventh Fleet as a Combined Task Force leader in a short warning, power projection, forcible entry scenario. The scenario includes a command post exercise, force on force maneuver, and a live fire field training exercise operating from the Australian ranges of Shoalwater Bay, Rockhampton, and Townsville as well as the Coral Sea.[14]

The differing scenarios and levels of tactical to operational warfighting that existed across the three experimentation venues provided capabilities to test the entire range of Joint Fires Initiative Block 2 capabilities. Each venue provided some unique training objectives. Experimentation within exercises provided real world scenarios with real world environmental factors. In some instances, not all Quick Wins could be tested never-the-less, proof of concept occurred and those capabilities showing merit were pushed forward with targeted programs of record capable of life cycle support. The final phase in the experimentation roadmap for a prototype that will field as a Joint Force capability is its transition. Transition is no simple task and as stated earlier in this paper, without a transition plan, the new capability may die on the vine. Transition represents one of the major efforts undertaken by the Joint Forces Command Joint and to this day proves to be one of the most difficult tasks in the Concept to Capability framework.[15]

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[14] Talisman Sabre Exercise Mission Statement

[15] Mr. George Bowers, interview by author, Suffolk, VA, February 15, 2008.

Transition is where the necessary bureaucracy of defense acquisition clashes with defense transformation. But the clash is controllable.

Transition

In the case of a material solution, transition of a transformational initiative is where a capability leaves experimentation and moves to a Service program of record. This step is probably the most crucial in the prototype life cycle and it too often is one that is not considered until experimentation is drawing to the end. Joint Fires Initiative Block 1 realized a successful transition due to operational necessity and a fortunate sequence of events. Other supporting concepts that were experimented with during Millennium Challenge 02 have had differing levels of success with transition but in all cases, these fresh start prototypes fell upon the need to transition once they showed merit.[16]

More important than trying to frame a transition plan at the conclusion phase of a prototype's life cycle is the intent to build the transition plan on the front end. Should the experiment prove successful, then the path to transition is already known. In the summer of 2004, the US Joint Forces Command established the Office of Prototype Oversight. The intent of the office was to provide oversight and guidance on the development and transition of capabilities to the Services. In theory, the Office of Prototype Oversight was to be engaged throughout the development phase and to offer recommendations to the Combatant Commander on those prototypes worthy of continued development. Decision

[16] US Joint Forces Command, Joint Experimentation Evolution Roadmap 1998-2009 Briefing by Mr. George Bowers, February 15, 2008. The roadmap identifies birth of Joint Concept Development and Experimentation in 1998 with the stand up of the Joint Experimentation Lab; Building Partnerships, Establishing Joint Context, and Fielding Prototype Solutions originated from Millennium Challenge 02; and a Joint Concept Development and Experimentation Enterprise Approach to find Innovative Solutions.

Point Criteria was established to help shape the development of a prototype and plan for its transition. Most importantly, the Office of Prototype Oversight was to provide the Commander a fresh set of eyes looking at the development timeline of prototypes and to help shape the transition plan. What the Office of Prototype Oversight unfortunately was not able to do was find a suitable method to bridge the gap from experimentation to program of record. As such, its nature became one of programmatic overhead and its utility was never realized.[17]

What did surface from the efforts of the Office of Prototype Oversight was the need to find a funding vehicle to bridge the transition gap. The concept of bridging funds is a critical link to the successful transition plan. Without a pocket of funds for the Combatant Commander or Service entity to use as bridging funds for transformational concepts, the experimenter is left to find funding in reserve dollars and can not effectively plan a budget and schedule. This is an area in need of further research as the Services and Combatant Commands will find it increasingly difficult to program for money aimed at prototypes in need of transition. Our rapid experimentation timeline and transformational initiatives live inside the two year PPBS cycle. Every effort should be made to develop capabilities and transition them inside a one year timeline. With that said, it is physically impossible to know which projects will need funding when a Program Objective Memorandum submission occurs.

As a simple and interim solution, the Department of Defense should earmark funds necessary for sustainment or transition of transformational capabilities. In recent

[17] Mr. George Bowers and Mr. James Nichol, interview by author, Suffolk, VA, February 15, 2008. The Office of Prototype Oversight was designed to report to the Chief of Staff, US Joint Forces Command with the intent to provide guidance on which experimentation efforts within the command were worthy of continued effort.

years, the Services have developed a multitude of material solutions, many which have had transformational impacts. Unfortunately, the majority of these fresh-start, rapid acquisition programs have been developed through supplemental funds made available to address critical warfighter needs. While the system is somewhat flexible enough to achieve the desired endstate, it is not designed for the continual and long-term process of Defense Transformation. The Secretary of Defense indicated that transformation is not a single condition to be attained but rather an on-going process to give us the necessary edge to keep our Armed Forces' capabilities ahead of any potential adversaries.[18] With that in mind, we must posture for a Defense spending plan with the expectation that supplemental dollars will not be a source of funds to continue to develop and field capabilities spiraled outside of Service acquisition programs.

[18] Department of Defense, *Transformation Planning Guidance*, 1.

6. Where Does the Joint Force Go From Here

A solid and successful force transformation plan hinges on a dedicated joint approach. With several Agencies and Services working transformation, the Department of Defense is well on its way to transform the force in the 21st century. Several avenues to force transformation exist. First, the evolutionary nature of programs of record will allow for a transformation. As warfighters continue to deploy in support contingency operations or train in order to be prepared for deployment, they will find newer ways to accomplish military objectives and will invent procedures with processes that do it better, faster, and more effectively. Their Service programs of record will capture the desired capabilities through program enhancements and will work toward budgeting to implement those changes. This evolutionary change is just as important as new fresh start methods, procedures, and capabilities. Existing programs provide for continuity in an ever changing force.

The shaping of force capabilities also leads to transformation in an evolutionary manner. As we move forward in the unknown future, we can be certain that our challenges will be shaped by the four different environments laid out in the National Defense Strategy and Quadrennial Defense Review. These Traditional, Irregular, Catastrophic, and Disruptive Challenges will all require unique means to mitigate their risk. Force shaping and restructuring is just the means to keep abreast of these threats. It allows us to rise to the challenge of the current world with a force shaped for today and at the same time, prepares us for the threat of tomorrow. Force shaping also allows us to continue to function with the extensive array of military capabilities that have been

procured to date. We don't desire to make a rapid shift in capabilities, but rather a smooth, methodical change in the posture of our military. The intent is to stay ahead of potential adversary threats. The nation can not fiscally afford a major rudder correction in our defense posture and as such, this molding and shaping of capabilities in an evolutionary nature is a key part to force transformation.

Evolutionary change alone is not the only path toward force transformation. We must look for revolutionary capabilities and apply them to our force in a rapid but deliberate manner. Our acquisition strategy must remain consistent to ensure we are spending our nation's treasure wisely while at the same time staying in the lead during the rapid changing nature of this information age. A focused experimentation campaign with dedicated transition planning is just one of the key aspects to this revolutionary change. It requires an open mind and some risk of failure to identify the golden nuggets that go forward to change our military capability, but it can be done with a reasonable amount of success guaranteed.

Engaging early on with centers of excellence within academia, industry, and the military ensures that relevant problems are addressed and that experimentation plans don't go down a road which aims to solve problems having little-to-no bearing on the world's stage we are living in today. Careful and close inspection of the requirements established by warfighters, challenges noted through lessons learned, and current day combatant command issues will lead to a focused problem area which needs to be addressed.

Industry has an incredible capability which can be tapped in order to create material solutions when required. Think tanks provide a cell of intelligent individuals

that can think outside of the box, and Service members are crafty individuals that will always find a new way to "get the job done." Merging this diverse array of people together brings a synergistic effect not seen when each are engaged in separate form. By merging everyone together in a warfighters' conference, the industrial workforce and academic community can gain first hand appreciation for the problem to be solved. And potential solutions can be considered immediately by the warfighter.

Engagement of Service programs of record before beginning an experiment will produce three highly desired outcomes. First, the Service Program Managers can consider the new capability envisioned and determine if there have been resources placed against it through the evolutionary nature of program refinement. Next, the Program Managers can determine equities and how the program could adopt the new capability or better, help shape it with the expert staff of acquisition professionals within the organization. Lastly, the Program Manager can offer assistance in the experimentation plan, whether that involves use of test equipment or personnel provided by the program to man a cell or simply to be present in the observer role to understand the impact the new anticipated transformational capability. In either case, the Service programs that either need to adopt the new capability for life long care and feeding or re-establish a program to carry on the new method of warfighting will have a jump start and can be in from the ground level to shape the future. This significantly eases the burden of convincing the Service that there is a new or better way to conduct business, and this is probably the most significant step in the process to ensure someone is prepared to receive the new experimental capability.

A robust test and evaluation plan will give the new transformational capability the relevance it needs and deserves prior to asking our nation's defenders to accept it as a new miracle drug for the Joint Force. It starts with a focused experimentation plan in a structured environment that can stimulate the new capability and subject it to the rigors it will receive in the real world. But this phase also allows for edits and adjustments to hardware, software, and procedures and allows capturing of vital evaluation data. Once the experiment in a closed system concludes, there is an opportunity for addressing areas that need more refinement. Then it must be retested in a free play role that accounts for human nature and the fog and friction of war. This should occur in a simulation to the maximum extent practical so that proper stimulus can still be applied and lessons learned captured throughout the event. Finally, application in the field environment will prove capabilities or reveal weaknesses in need of critical attention and will garner the true support of the warfighter through first hand experience.

The final piece to ensure a potential transformational capability can exit the experimentation world and become a reality for the Joint Force of the future is to dedicate an effort to its transition. This area requires detailed planning from the start and will not happen without a level of effort applied by the experimenter. Even through the process of engagement with a program of record on the front end for development of new capabilities, there is going to be a two year gap that must be bridged once the concept proves worthy of continued sustainment. Bridging funds and a transition plan to ensure proper training, documentation, spares, and simulation if required have to be considered as part of the transition plan. This transition must be initiated on the experimentation end and finalized on the program of record end. It must occur in a seamless fashion as one

should consider that the warfighter exposed to the new warfighting capability in the experiment, exercise, and potential operation will not accept a break in capability while waiting for the acquisition community to pick up the pieces.

This process for concept to capability provides a framework and is only but one recommendation on how to successfully move a transformational initiative from concept to capability. The process has been proven successful and should be considered by anyone who aims to create a new start capability and insert it into our Joint Force capabilities profile while working outside the legacy Defense Acquisition cycle. Other efforts have proven successful as well and in all cases, support for the capability to succeed must come from leaders at all levels.

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Vita

Colonel Werth is a 1986 graduate of the University of Minnesota where he earned a Bachelor of Aerospace Engineering and Mechanics degree and a 1999 graduate of the University of Tennessee where he earned his Master of Science in Aviations Systems. Following graduation from the University of Minnesota Navy ROTC program Colonel Werth was commissioned a Second Lieutenant in the United States Marine Corps. He completed the US Marine Corps Basic Officer Course and Naval Aviation Flight Training. Following an initial tour in the AV-8B Harrier, Colonel Werth attended the United States Navy Test Pilot School and subsequently served as a Harrier Test Pilot.

Colonel Werth has served in several staff positions and has served as the Executive Officer of VMA-223, the Commanding Officer of VMU-2, and will take command of the Marine Corps Air Station Yuma, Arizona in July 2008. Colonel Werth has three combat tours in support of Operations Enduring Freedom and Iraqi Freedom and has accumulated over 2500 hours of pilot time in over 20 fixed and rotary wing aircraft. He has 186 total combat missions. Personal awards include the Bronze Star, Defense Meritorious Service Medal, Air Medal Strike/Flight 4th Award, and the Navy/Marine Corps Commendation Medal.

From 2002 to 2005, Colonel Werth was assigned to US Joint Forces Command. During that tour, Colonel Werth led the Joint Fires Initiative which integrated Service fires programs of record and command and control systems. His efforts included multiple changes to the Automated Deep Operations Coordination System (ADOCS) for use by all regional combatant commands.